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The nurses have the opportunity of learning many other things pertaining to laboratory work, the making of culture media, stains, reagents and of using interesting apparatus needed in the laboratory. If the nurse is apt, earnest, careful and conscientious in her work, she gains a great deal, but if she takes it up in a dilettante way, no credit is given to her work nor is she recommended as an office nurse. Laboratory work will not appeal to those who seek the soft spots and easy places, and so lose the golden opportunity, nor will it appeal to those who do nothing for their profession, because they mean their profession to do everything for them, but to the earnest, student woman whose watchword is Work, that open sesame to every portal, and the measure of success in every walk of life, a new and intensely interesting field is opened.

ELECTRO-THERAPEUTICS

(Fourth Paper)

By MARTIN W. CURRAN, M.D.
Chatsworth, N. J.

Before taking up the subject of the application of electrical currents for the relief of diseased conditions, it might be well to discuss briefly the triumph of hope over experience.

Electricity has its laws, as well as gravitation, and the person who proposes a scheme which violates the most elementary principles of natural science is either a fool or a knave. Some of the swindles which are now before the public are exceedingly barefaced, and yet they are wonderfully successful in drawing the money out of the pockets of the people, and the most emphatic testimonials from "respectable" clergymen. Beware of all so-called electric pads, belts, bands, hair-brushes, armadillos and electric garments; they are simply swindles intended to deceive. The most astonishing thing is that their advertisements are published in so-called decent journals.

Electricity may be used either generally or specially, and it should be a rule always to begin with a weak current and gradually increase its strength, to the desired measurement. Strong currents are used only in exceptional cases. When it is desired to affect the system generally, the patient may hold the electrodes, or current carriers, one in each hand, or, while he holds one, the nurse may apply the other to various parts of the body. In order to influence any particular muscle or group of muscles, the sponges attached to the electrodes and the

part of the body affected should be moistened with a solution of salt and water. In order to excite a muscle most effectually, we apply one electrode to the motor point of the nerve or, in other words, to the point where it enters the muscle. All electrodes, with their sponges or absorbent cotton coverings, and all metallic points and connections must be kept bright and clean, as batteries are frequently rendered inactive by want of attention to this detail.

Galvanization. We have learned that a galvanic current is of large volume (amperage), but of low tension (voltage), therefore it has not the driving power of the faradic current.

When galvanism is applied to the brain, flashes of light are produced; when applied to the tongue, sensations of taste are increased; and when the ear is electrized, sounds are generated. When applied to a nerve of motion, it produces muscular contractions; if to the skin, sensations of pricking and heat. The refreshing effects of galvanism are marked in cases of excessive fatigue, and in disease when the power of the muscles is weak or entirely lost, by it the increased sensibility in neuralgia, sciatica, and various other nervous affection is relieved. The effect attributed to galvanization of the sympathetic nerve is to increase the size of the bloodvessels and augment the flow of bood to the part, therefore is contra-indicated in inflammatory conditions. It is important to galvanize the sympathetic in diseases of the brain, spinal cord, wasting palsy, infantile paralysis, and in palsies of the extremities, etc. It restores lost nerve power, excites muscular irritability, and imparts heat and vitality where fatty degeneration of the muscles has not progressed beyond all possibility of cure; thus the importance of early, persistent, and intelligent applications of the continuous current to the diseased part at once becomes apparent.

Faradization. As described when discussing the induction coil, we know that in faradism the current is perpetually interrupted and renewed at very short intervals by a self-acting mechanical appliance, called the armature. A faradic current consists of high tension (voltage) and low amperage (volume), therefore possessing great driving or penetrating power. The action of the faradic current on living tissue is not so complex as galvanism, and is better understood.

Faradization disturbs the particles of matter which enter into the formation of nerves, tissues and muscles of the body, exciting them into healthy activity, reëstablishing their functions when impaired or lost. Again, a slowly-interrupted current permits the alternate contraction and expansion of inactive or paralyzed muscles, and thus increases their nutrition. It also determines a larger supply of blood to the part electrized, with its consequence of increased heat and size. It stimulates

the sentient nerves of the part submitted to its influence, and thus becomes an important remedy in anesthesia, or loss of sensation.

Sinusoidal current. Briefly stated, a sine wave, oscillating or sinusoidal current, is a current which rises from zero to a certain maximum, then, without breaking, drops or recedes to zero, and without pausing, rises to the same maximum in the opposite direction, again receding, without breaking, to zero, and continuing thus to rise and fall without intermission or break, first flowing in one direction, then the other.

This current has the advantage of being painless in application, even while producing the most vigorous muscular contractions. It is employed as a means of passive exercise, especially for the development of the muscles of the back in spinal curvatures, and the muscles of the abdomen in cases of enteroptosis. It is also an excellent means of exercising paralyzed muscles when they have not reached a too advanced state of degeneration.

It is both interesting and agreeable to see the muscles of a patient under its influence contracting with as much vigor as though he were chopping or sawing wood or climbing a hill, although the patient lies quietly on a lounge, experiencing no other sensation whatever than that of motion.

Vibration. Electricity is the most flexible, controllable and convertible form of energy known, consequently it is frequently used as the medium for the production of other forms of energy that have been found invaluable in therapeutics.

Electrical vibratory stimulation is the rapid reciprocating movement consequent upon the tendency of a body, or parts of a body, disturbed from a position of rest to recover that position again. Vibration is curative by mechanically pressing out from the tissues material which needs to be removed, or to have its natural flow accelerated; the first in the case of inflammatory effusions, the second, in the case of imperfect circulation, as it stimulates a large blood-flow to parts of the body that may be deteriorating because of a deficiency of it.

Light rays. The chromo-therapeutic use of light rays is a valuable addition to our remedies, and eliminating the many illusory statements which have been made on this subject by physicists, poets and others, there can be no doubt that the human organism, even aside from the responsive function of the visual apparatus, is affected by different colors in characteristic ways. Red has been known as the color of passion and love. Green is a mild sedative, it quiets the mind and eases the body. Blue is still more distinctly sedative. The value of violet rays in inflammatory and cancerous conditions is fully recognized. White

combines the effect of all colors and is utilized in the electric light bath. The skin is a poor conductor of heat, but readily transmits light and radiant energy. Then, in the deeper tissues, it becomes changed into heat. Its physiological action depends upon the heat and chemical rays coming in contact with the substances that are resistant to their passage and thus transforming them into heat and light energy.

SCIENCE APPLIED TO PRACTICAL NURSING[1]

By MARGARET DIETER

Pupil Nurse, Massachusetts General Hospital

As this paper is to some extent argumentative, it seems best to begin with a definition of terms. In the first place, our present day connotation of the word science calls up a picture of laboratories, special equipments, men absorbed in their profession. Most of us, too, are reminded of the fine exactness and careful accuracy with which these men work. Zoölogy, botany, physics, chemistry, are thought of most commonly as their field of labor, but they are really only a small part of the domain of "science." Science fulfilling its ancient Latin meaning of "knowledge" has come to include such studies as psychology, sociology and economics. Even language, in some of its aspects, may be considered as a science.

A few general remarks might be made as to what a student in any course in science is supposed to get as the result of his work. Apart from knowledge of the subject itself, he should have learned that results are best attained by attention to details, close observation, accuracy and finished work. Added to this is the patience which keeps a man hard at work in spite of discouragements. Are not these same qualities necessary in good nursing? Happy, therefore, is she who has served a probationary period, before entering the hospital, in even one science.

In these days, it goes without saying that a nurse's training embraces a certain amount of theoretical study in addition to the purely practical work. The limits of this paper forbid discussion of the bearing of preliminary science study to the student-nurse's anatomy, physiology, bacteriology, etc. We are concerned with practical work entirely, that is to say, the daily floor work of the ward—routine household duties, giving of medicines, serving of meals, dressings, in short, any of the things

[1] The following paper was written by a pupil nurse of seven months' hospital experience. She has worked from her own observations only. Therefore, she cannot in any sense be said to have completely covered her subject.